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Treppish

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[54] **GYRATORY CRUSHER HAVING MEANS FOR RETAINING SPRING COMPRESSION FOR CONCAVE SUPPORTING UPPER FRAME**

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[52] **U.S. Cl.** **241/207**

[51] **Int. Cl.** **B02c 2/04**

[58] **Field of Search** 241/207, 208, 209, 241/214, 215, 216; 29/446, 452

[56] **References Cited**

UNITED STATES PATENTS

3,614,023	10/1971	Archer	241/215 X
3,009,660	11/1961	Symons et al.	241/207 X

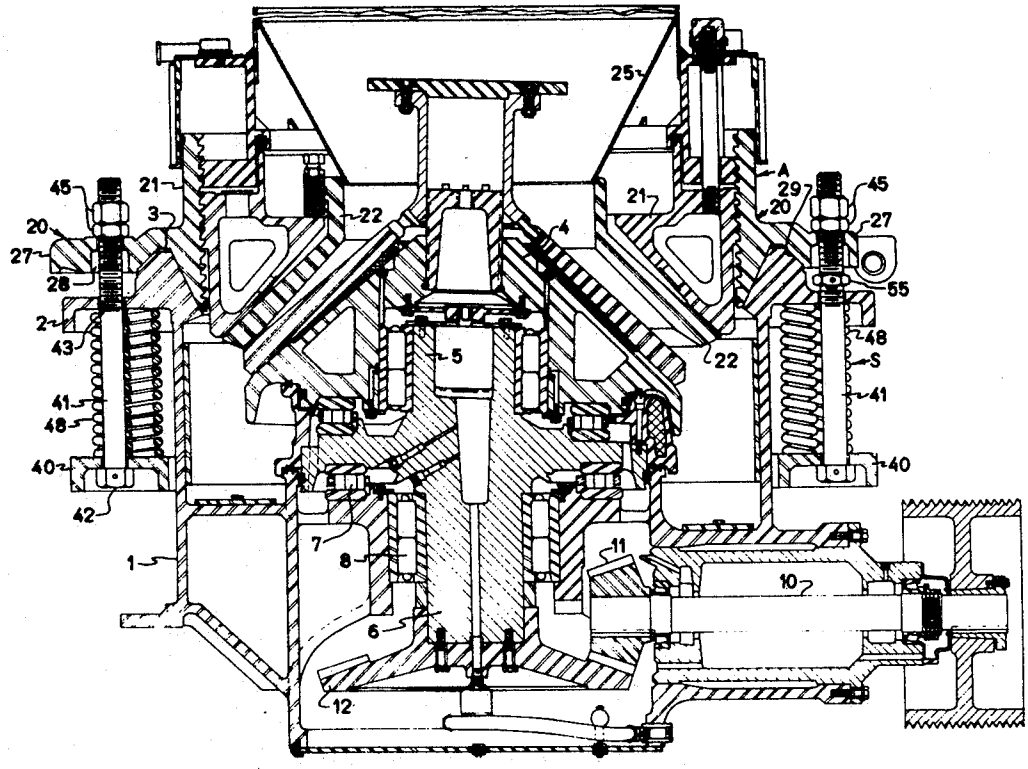
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[57] **ABSTRACT**

A gyratory crusher of the type having a pair of crushing members such as a generally concial shaped head and a cooperating concave which surrounds the head to form an annular crushing chamber therewith. The concave and its supporting upper frame are spring loaded on the main frame and in a downward direction for cooperation with the crushing head. Means are provided for maintaining the compression in the springs which bias the upper frame and its concave downwardly on the main frame, this means being shiftable to an inoperative position while the crusher is operative and the means then being shiftable to a spring compression retaining position whereby the upper frame and its concave can be detached and removed from the main frame.

3 Claims, 2 Drawing Figures



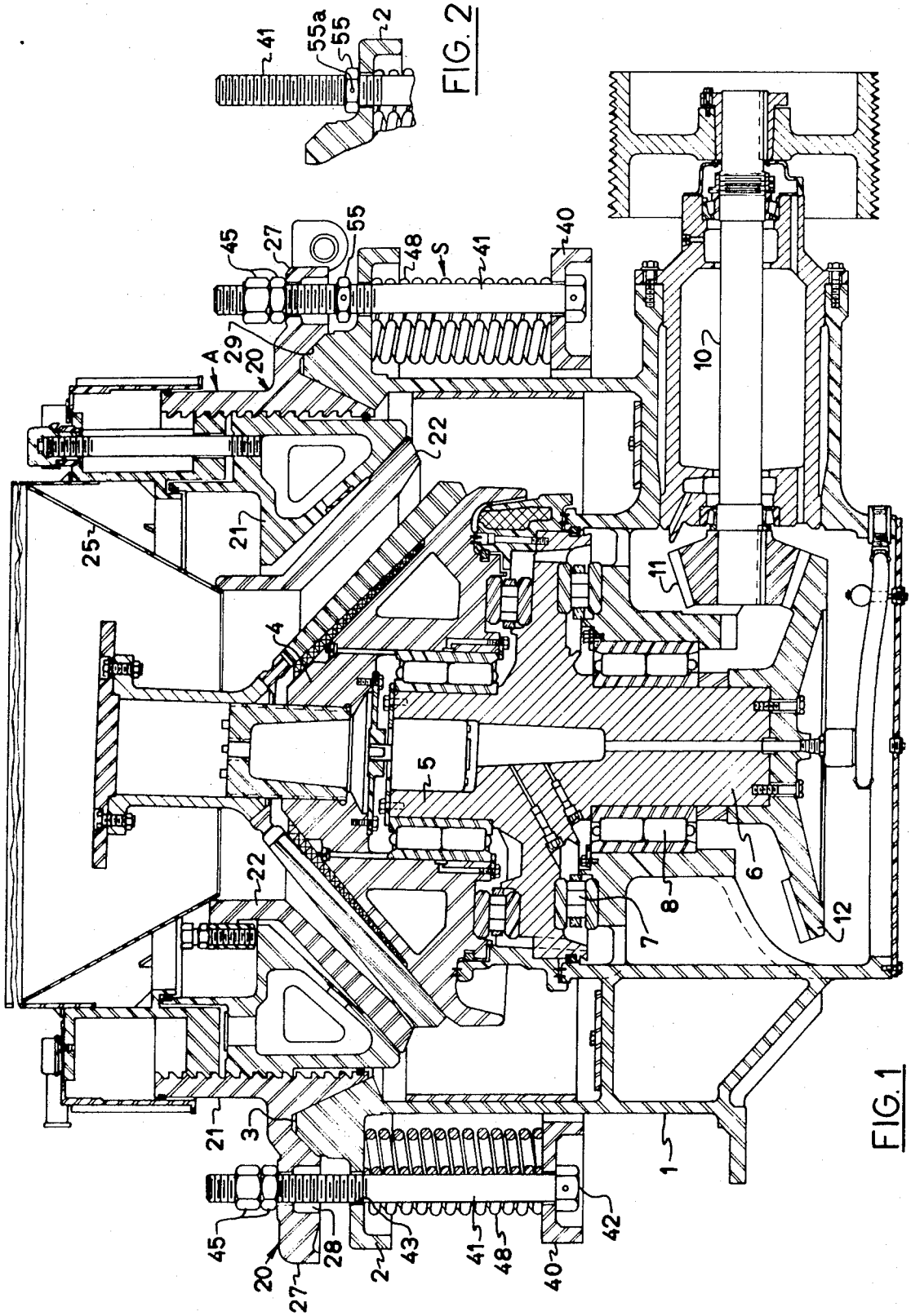

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FIG. 2

FIG. 1

GYRATORY CRUSHER HAVING MEANS FOR RETAINING SPRING COMPRESSION FOR CONCAVE SUPPORTING UPPER FRAME

BACKGROUND OF THE INVENTION

The invention pertains to gyratory crushers of the type having a generally lower conical head which cooperates with an upper concave and forms a crushing chamber therewith. The head is moved in a gyratory motion relative to the stationary concave to effect a crushing action of the material located in the annular space between the head and concave. The concave is supported by an upper frame which in turn, is resiliently loaded downwardly on the main frame so as to present the concave in the proper attitude to the cooperating head. Compression springs, for example, are used to bias the upper frame and its concave downwardly in proper relationship to the head and the compression of these springs is set by various means such as threaded bolt means which are adjustable in length to thereby adjust the compression of the springs. Periodically it is necessary to remove the upper frame and the concave for repair or replacement of the various parts and heretofore it has been necessary to relieve the compression on the springs before disassembling the upper frame. This has been a time consuming and laborious task and it was then necessary to compress the springs upon reassembling of the machine and readjust the upper frame and its concave relative to the head.

Examples of such prior art types of crushers are shown in the U.S. Pat. Nos. 3,533,568, which issued Oct. 13, 1970 and entitled "Gyratory Crusher," 3,341,138, which issued Sept. 12, 1967 entitled "Adjusting Mechanism for Gyratory Crushing Bowls," and 2,881,981 which issued Apr. 14, 1959 and entitled "Gyratory Crusher Concave Adjustment," all of which patents have been assigned to an assignee common with the present invention.

SUMMARY OF THE INVENTION

The present invention provides a gyratory crusher of the type having a generally conical shaped head, and a concave mounted in upper spaced relationship to the head and defining an annular crushing chamber therewith. The concave is mounted on the upper frame and the upper frame in turn, is resiliently loaded by compression springs in a downward direction on the main frame. The arrangement is such that adjustable bolt means are provided between the upper frame and compression springs which in turn react against the main frame, the adjustable bolt means having additional means for being shifted into spring locking position during which the upper frame can be removed, and another inoperative position during which the springs function in their normal manner to bias the upper frame resiliently downwardly on the main frame.

The arrangement provided by the present invention permits the adjustable bolt means to lock-out or hold the compression springs in their operating position and consequently permit the upper frame to be loosened and removed from its mounting on the main frame. In this manner, a simple means is provided for avoiding the necessity of releasing the compression of the springs when the upper frame is to be removed and again having to recompress the springs when the upper frame is again to be reassembled on the main frame.

These and other objects and advantages of the present invention will appear hereinafter as this disclosure progresses, reference being had to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical, sectional view through a crusher embodying the present invention; and

FIG. 2 is an enlarged, fragmentary view of a portion of the device shown in FIG. 1, more particularly illustrating the adjustable lock-out means for the upper frame, in a moved position.

DESCRIPTION OF THE INVENTION

The gyratory crusher provided by the present invention includes a main frame **1** having a radially extending, annular flange **2** having an inwardly and outwardly tapering ridge **3.** A generally conical shaped crushing head **4** is mounted on an eccentric portion **5** of the eccentric shaft **6,** the shaft **6** in turn being rotatably journalled in anti-friction bearings **7** and **8** in the main frame. The eccentric shaft is rotated by a power shaft **10** through a pinion gear **11** and a large bevel gear **12** and the action of the head is such that it moves with a gyratory motion due to the rotation of the eccentric shaft.

The crusher also includes an upper frame and concave assembly A which is removably mounted on the main frame **1,** as will appear. The assembly includes an upper frame **20** to which is secured the support bowl **21** to which in turn is fixed the manganese concave **22.** The concave **22** and the head **4** together define an annular crushing chamber therebetween and the material to be crushed is fed into the hopper **25** and then falls into the annular chamber where the gyratory motion of the head acts to crush the material against the concave in the known manner.

If a more complete description of the mounting and construction of the head, eccentric shaft, and their drive is deemed to be either necessary or desirable, reference may be had to the co-pending U.S. application Ser. No. 212,553, filed Dec. 27, 1971, and entitled "Gyratory Crusher having Anti-Spin means for Head," which application has been assigned to an assignee common with the present invention.

The upper frame **20** includes an annular radially extending flange **27** having a series of apertures **28** circumferentially spaced therearound. The frame **20** has a recess portion **29** that complements the ridge **3** of the main frame and seats on the ridge during normal operation.

Compression spring means S act between the main frame and the upper frame for resiliently biasing the upper frame downward on the main frame, that is for resiliently holding the upper frame seating on the ridge **3.** The resilient means permits the upper frame assembly to rise when particularly hard or uncrushable materials are encountered in the crushing chamber, in the known manner. More specifically, the compression spring means includes a lower spring retaining ring **40** located generally around the main frame, a series of threaded bolts **41** having a head **42** that abuts upwardly against the ring **40,** and the bolts **41** also extend through aligned apertures **43** in the flange **2** of the main frame. The bolts then also extend upwardly through the circumferentially spaced apertures in the upper frame and first adjustable nut means **45** are engaged on the

threaded end of the bolts and when tightened thereon act to compress the series of springs **48** that act between the flange **2** of the main frame and the lower spring retaining ring **40.**

If a more complete description of the main frame, upper frame, or the compression spring means described above is deemed to be either necessary or desirable, reference may be had to the said patents.

Adjustable means are provided for the compression spring means by means of which the compression of the springs **48** may be maintained when it is desired to remove nuts **45** to permit the upward removal of the concave assembly for replacement or repair of the various parts. The adjustable means includes second adjustable nut means **55** which are threadably engaged on bolts **41** and are located immediately above the flange **2** of the main frame. These second adjustable nut means are adjustable to a first position in which they are tightened on their bolts and act on the main frame independently of the other nut means **45,** and thereby act to hold the springs **48** compressed. The nut means **45** can then be removed from the bolts and the entire concave assembly lifted from the main frame. Set screws **55a** in nuts **55** lock them in place.

When the necessary replacement or repair has been made, it is a simple matter to then again seat the upper frame on the ridge of the lower frame, with the bolts **41** protruding through the aligned apertures **28** of the upper frame flange **27.** The nuts **45** are again installed and tightened down to the proper location and the second adjustable nut means **55** can be backed up on their bolts to a position away from the main frame. The bolts **45** are then effective to maintain the concave frame assembly resiliently biased by the springs on the main frame ridge.

By means of the present invention, the second adjustable nut means can be shifted from an inoperative position in which the springs are free to function in their normal releasing manner, and these second nut means are also shiftable to another position in which they lock the springs in compressed position and thereby permit the concave assembly to be removed without disturbing the spring settings.

I claim:

1. A gyratory type crusher having a main frame, a crushing head mounted in said main frame, an upper frame removably mounted on said main frame and having a concave cooperable with said head to define an annular crushing chamber, compression spring means acting between said main frame and said upper frame for resiliently biasing the upper frame downwardly on said main frame, said compression spring means including adjustable means adjustable to a position to render said spring means ineffective to hold said upper frame and thereby permit said upper frame to be removed from said main frame; said adjustable means being adjustable to another position away from said main frame to permit said spring means to bias said upper frame downwardly on said main frame.

2. A gyratory type crusher having a main frame, a generally conical shaped crushing head mounted in said main frame, an upper frame removably mounted on said main frame and for supporting a concave which cooperates with said head to define an annular crushing chamber, compression spring means acting between said main frame and said upper frame for resiliently biasing the upper frame downwardly on said main frame, said compression spring means including a lower spring retaining ring located generally around said main frame; threaded bolts extending through said ring, said main frame, and said upper frame; compression springs acting between said main frame and said lower spring retaining ring, first adjustable nut means on said bolts for compressing said springs when said nut means are tightened on said bolt means and thereby biasing said upper frame on said main frame, and second adjustable nut means on said bolt means and adjustable to one position in which said second nut means acts on said main frame independently of said first nut means to thereby compress said springs and permits the upper frame to be removed from said main frame, said second nut means being adjustable to another position away from said main frame to permit said springs to bias said upper frame, through said bolts, said first nut means and said ring, downwardly on said main frame.

3. In a gyratory crusher of the type having a main frame, a crushing head mounted in said main frame, an upper frame and concave assembly removably mounted on said main frame and having a concave which cooperates with said head to define an annular crushing chamber, compression spring means acting between said main frame and said assembly for resiliently biasing said assembly downwardly on said main frame, said compression spring means including a lower spring retaining ring located generally around said main frame; threaded bolts extending through said ring, said main frame, and said assembly; compression springs acting between said main frame and said lower spring retaining ring, and first adjustable nut means on said bolts for compressing said springs when said nut means are tightened on said bolt means and thereby biasing said assembly on said main frame; the improvement comprising, second adjustable nut means on said bolt means and adjustable to one position in which said second nut means acts on said main frame independently of said first nut means to thereby compress said springs and permits said assembly to be removed from said main frame; said second nut means being adjustable to another position away from said main frame to permit said springs to bias said assembly through said bolts, said first nut means and said ring, downwardly on said main frame.

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